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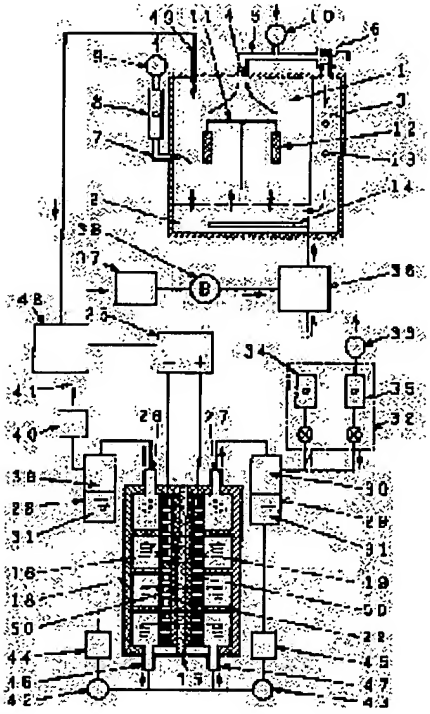
(54) OZONE WEATHER METER



(57)Abstract:

PROBLEM TO BE SOLVED: To obtain an ozone weather meter which achieves a checking for deterioration rubber, resin and fiber products and the like in an ozone gas by artificially producing an atmosphere of an ozone gas in view of the fact that the cracking of the rubber products is caused by a trace of ozone gas existing in the atmospheric air.

SOLUTION: In this ozone weather meter used as ozone generator, a platinum plating 50 is applied on both surfaces of an ion exchange membrane 15, which 15 is integrally grasped by a cathode plate 16 and an anode plate 19. Water is decomposed by a voltage applied to a cathode and an anode and an ozone gas generated on the anode plane 19 is diluted by air to produce an atmosphere of a required concentration of ozone.

CLAIMS

[Claim(s)]

[Claim 1] It is a thing about the ozone weather meter which examines the crack of rubber etc., and a degradation phenomenon in an ozone gas air current. Perform platinum plating to both the film surfaces of ion exchange membrane as an ozonator, and this field is contacted electrically at one side. The anode plate which carried out lead-dioxide plating to the porous titanium plate which puts the negative plate which carried out platinum plating on the porous titanium plate used as an electric supply plate, contacts electrically like other fields, and turns into an electric supply plate in piles Pinch ion exchange membrane with a negative plate and an anode plate, pile up the both sides in a box-like case, and it considers as one. Circulating through pure water in a box-like case in water supply opening and gas exhaust which carried out the pressure welding of a negative plate and the anode plate to ion exchange membrane with two or more cylindrical projections prepared in the box-like case inside, and were established in the both box-like case The ozone weather meter which electrolyzes water with the direct current voltage impressed to cathode and an anode plate, takes out the ozone gas which occurs on an anode plate from gas exhaust, dilutes this with air, carries out a supplied air to an ozone gas chamber, and is characterized by making a necessary ozone level ambient atmosphere.

[Claim 2] Shunt the oxygen and ozone gas which occur on an anode plate with splitting equipment, and a part is diluted with the air and the mixer which were taken in through the air filter and the blower. By changing a splitting ratio using the splitting equipment which a supplied air is carried out to an ozone gas chamber from ozone gas-evolution tubing, and the other sections change ozone into oxygen through an ozone processor, and adjusts the inside of emission and a chamber to necessary concentration outside The ozone weather meter of claim 1 characterized by expanding an ozone density range.

[Claim 3] The ozone weather meter of claim 1 characterized by controlling the electrolytic current of DC power supply by the ozone level automatic controller which displays and controls the ozone gas concentration in an ozone gas chamber, and carrying out control and detailed adjustment of an ozone level for an ozone yield.

[Claim 4] The ozone weather meter of claim 1 characterized by holding pure-water temperature uniformly while circulating through the pure water within a box-like case with a pump and dividing gas and water through the vapor-liquid-separation machine in a circulatory system way, and a cooling system.

[Claim 5] The ozone weather meter of claim 1 which oxidizes by the oxidation catalyst, uses as a steam the hydrogen gas generated on a negative plate, and is characterized by

emitting to the open air.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] The ozone gas of the minute amount which exists in atmospheric air is the cause of crack initiation of rubber goods, and this invention generates ozone gas artificially, builds an ozone gas ambient atmosphere, begins rubber goods, and relates to the ozone weather meter which investigates the degradation phenomenon by ozone gas, such as plastics and textiles.
[0002]
[Description of the Prior Art] The approach of carrying out ozone gasification was conventionally taken [oxygen / in air] similarly by use or silent discharge in the ultraviolet rays by the quartz mercury lamp generating ozone gas artificially. the approach of using the ultraviolet rays by the quartz mercury lamp -- an ozone level -- 0-2 ppm the approach make it the low concentration of extent and according to silent discharge -- 2 ppm the above high concentration is possible -- but -- silent discharge -- others [generation of gas / ozone] -- further -- NO and NO2 etc. -- there was a fault by which generating of nitrogen oxidation gas is accompanied. In order to obtain pure ozone gas, oxygen needed to be supplied to the silent discharge cylinder using the oxygen chemical cylinder, and ozone needed to be generated. This approach was accompanied by danger, such as a fire, by concentration not being fixed with flow rate change, and using a bomb.
[0003]
[Problem(s) to be Solved by the Invention] This invention electrolyzes water, in case oxygen and hydrogen gas are generated, oxygen gas is changed into ozone gas by the catalysis by the lead dioxide, ozone gas is generated, and it is an ozone weather meter as dilutes with air and it comes to send to a chamber so that it may become the necessary concentration which examines this, and an oxygen cylinder is unnecessary and enables the ozone trial of the large high-concentration range from the low concentration of pure ozone gas.
[0004]
[Means for Solving the Problem and its Function] In order to attain the above-mentioned purpose, platinum plating is performed to both the film surfaces of ion exchange membrane as an ozonator. Contact this field electrically at one side, and the negative plate which carried out platinum plating is put on the porous titanium plate used as an electric supply plate. The anode plate which carried out lead-dioxide plating to the porous titanium plate which contacts electrically like other fields and turns into an electric supply plate in piles Pinch ion exchange membrane with a negative plate and an anode plate, pile up the both sides in a box-like case, and it considers as one. The pressure

welding of a negative plate and the anode plate is carried out to ion exchange membrane with two or more cylindrical projections prepared in the box-like case inside. Water is electrolyzed with the direct current voltage impressed to cathode and an anode plate while circulating through pure water in the box-like case in water supply opening and gas exhaust which were established in the both box-like case. It is based on the ozone weather meter which takes out the ozone gas which occurs on an anode plate from gas exhaust, dilutes this with air, carries out a supplied air to an ozone gas chamber, and is characterized by making a necessary ozone level ambient atmosphere.

[0005]

[Example] Drawing 1 is one example of the ozone weather meter of this invention. The ozone gas chamber 1 is made from the ingredient which cannot decompose ozone gas easily. The circulation air course is formed in the outside of an inferior surface of tongue, a side face, or a tooth back, and air blows off from the air hole of a large number opened in the bottom plate through the side-face air course 3 and the inferior-surface-of-tongue air course 2 with the circulation blower 6 connected by the exhaust port 4 and duct 5 of the center of head lining. To the ozone gas chamber 1 Return, A part of the ozone gas escapes from the exhaust pipe 7 of a side attachment wall, and is emitted to the open air through a flowmeter 8 and the exhaust air treater 9, and prepares branching in a duct 5, attaches an air filter 10, and incorporates clarification air.

[0006] There is a sample rack 11 in the center of the ozone gas chamber 1, and it examines by hanging a test piece 12.

[0007] The ozone gas-evolution tubing 14 is formed all over the side-face air course 3 all over a heater 13 and the inferior-surface-of-tongue air course 2, and it has the structure of carrying out equalization of temperature and concentration during circulation of air, and if the location of a heater 13 and the ozone gas-evolution tubing 14 is among an air course, specification of a side face and an inferior surface of tongue will not be carried out.

[0008] The ozonizer shows the fracture surface to drawing 1 by the approach by the water electrolysis using the ion exchange membrane 15 of a fluororesin system.

[0009] Drawing 2 showed an example of the configuration of an ozonizer, thin platinum plating is performed, to porous titanium, the cathode electric supply plate 16 which carried out platinum plating lapped, both sides of an ion exchange membrane 15 are covered in the field of one of these, and the box-like case 18 has covered this through packing 17 further.

[0010] The anode plate electric supply plate 19 which carried out lead-dioxide plating processing to the porous titanium plate lapped with other platinum plating sides of an ion exchange membrane 15, it has covered, and the box-like case 21 has covered this through packing 20 further.

[0011] It works so that this projection may push the cathode electric supply plate 16 and the anode plate electric supply plate 19 against the platinum plating side of ion exchange membrane 15, when two or more cylindrical projections 22 stand inside the case and a box-like case is piled up. It is easy to pass along a current, and seal processing is made and he is trying for electric contact of the cathode electric supply plate 16, the anode plate electric supply plate 19, and ion exchange membrane 15 to become good, and, as for the doubling part of the box-like cases 18 and 21, for there to be no leak further.

[0012] To the cathode electric supply plate 16 and the anode plate electric supply plate

19, lead wire 23 and 24 penetrates the box-like cases 18 and 21, respectively, and it is pulled out outside, and connects with the (-) pole of DC power supply 25 shown in drawing 1 , and the (+) pole, respectively, and the following reaction formula (1), (2), and (3) arise in an anode plate and cathode.

$2H_2O \rightarrow O_2+4H^++4e^-$ .... (1)

$3H_2O \rightarrow O_3+6H^++6e^-$ .... (2)

$10H^++10e^- \rightarrow 5H_2$ .... (3)

Although (1) type is a reaction which oxygen generally generates in water electrolysis in an anode plate However, if lead-dioxide plating is performed to the anode plate, will combine immediately with the oxygen molecule O_2 the oxygen atom [O] generated with the moisture solution in the catalysis, and (2) types which become ozone O_3 will be materialized. Hydrogen ion H^+ generated by (1) and (2) formulas It moves in the inside of ion exchange membrane, and arrives at cathode, a charge is got, and it becomes hydrogen gas.

[0013] When (3) types are materialized in cathode, with the electrode using the beta mold PbO_2, they are 20 A/dm2. About 6% of ozone level generating was checked.

[0014] In drawing 1 , ozone gas + oxygen gas (ozone gas is called hereafter.) and hydrogen gas 39 come out from the upper part of the box-like cases 18 and 21, and the gas exhaust pipes 26 and 27, go into each vapor-liquid-separation machine 28 and 29, and carry out splitting allocation of the ozone gas 30 at the flow rate which should carry out decomposition processing with the quantity of gas flow which should be sent to the chamber which was led to splitting equipment 32 and suited the necessary ozone level in the ozone gas chamber 1 here, and the ozone processor 33.

[0015] Namely, set it as the flow rate distributed to the flowmeter A34 and the flowmeter B35, and the ozone gas which passed the flowmeter A34 goes into a mixer 36. Dilution mixing is carried out with the fresh air attracted with the blower 38 through the air filter 37 here, and it is emitted in the ozone gas chamber 1 from the ozone emission tubing 14, and the ozone gas which passed the flowmeter B35 passes the ozone processor 33, is changed into oxygen from ozone, and is emitted to the open air.

[0016] On the other hand, the hydrogen gas 39 included in the vapor-liquid-separation machine 28 emits an oxidation catalyst 40 outside as a steam 41 by the intervening chemical reaction.

[0017] The heat generated with electrolysis by sucking up the water which collects on the pars basilaris ossis occipitalis of the vapor-liquid-separation machines 28 and 29 with pumps 42 and 43, and returning it to the water supply openings 46 and 47 of a box-like case pars basilaris ossis occipitalis through condensators 44 and 45 Although it is emitted outside and the equipment of a condensator is not shown in drawing with condensators 44 and 45, although a water cooling type and air cooling can be considered, generally many air cooling of fan cooling is used, and this is carried [both] out a hydrogen gas and ozone gas side.

[0018] The current of DC power supply 25 of electrolysis is controlled by the ozone level automatic controller 48. The ozone gas in a chamber is incorporated to the ozone level automatic controller 48 from the ozone extraction opening 49 prepared in the ozone gas chamber 1. The method which controls a current value so that the value is in agreement with the set point, while measuring ozone gas concentration, Namely, to the set point, when the measured value is low, increase a current, make electrolysis prosperous and the

yield of ozone gas is increased. Conversely, by reducing a current, reducing electrolysis and reducing the yield of ozone gas, when the value measured to the set point is high, it adjusts so that ****** and the ozone level in a chamber may be made in agreement with the set point in the set point.

[0019] In the case of the ozone gas obtained by the ozone gas obtained by electrolyzing water being pure, and carrying out silent discharge of the air by one side, it is NO generated in order that the nitrogen gas in air may oxidize, and NO2. Although it had been influenced [of nitrogen oxides] other than the effect by pure ozone gas since it was mixing, the deterioration test by pure ozone gas became possible by this invention here.

[0020]

[Effect of the Invention] According to this invention, the pure high-concentration ozone gas trial was attained without using a high-pressure-oxygen bomb etc. A feedwater is good at pure water because of ion-exchange-membrane use, and even if it faces water electrolysis, since it is not necessary to use dangerous electrolyte water solutions, such as a sulfuric acid, caustic alkali of sodium, and caustic potash, it is very safe. Since the gas exhausted, i.e., hydrogen gas, changed ozone gas into gas safe as oxygen gas as water and it was emitted to the open air, it became a very clean and safe testing machine.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The block diagram of the ozone weather meter possessing the ozonizer which carried out this invention.

[Drawing 2] The block diagram of the ozonizer used for the equipment of drawing 1 .

[Description of Notations]

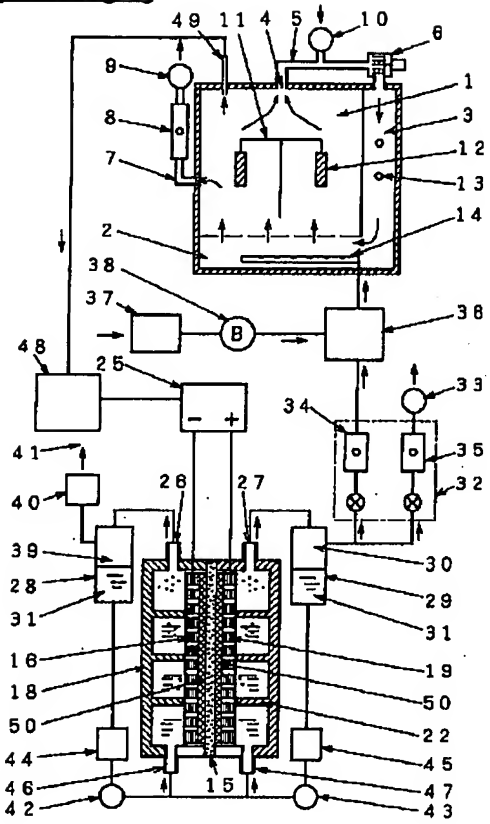
1 Ozone Gas Chamber
2 Inferior-Surface-of-Tongue Air Course
3 Side-Face Air Course
4 Exhaust Port
5 Duct
6 Circulation Blower
7 Exhaust Pipe
8 Flowmeter
9 Exhaust Air Treater
10 Air Filter
11 Sample Rack
12 Test Piece
13 Heater
14 Ozone Gas-Evolution Tubing
15 Ion Exchange Membrane

16 Cathode Electric Supply Plate
17 Packing
18 Box-like Case
19 Anode Plate Electric Supply Plate
20 Packing
21 Box-like Case
22 Cylindrical Projection
23 Lead Wire
24 Lead Wire
25 DC Power Supply
26 Gas Exhaust Pipe
27 Gas Exhaust Pipe
28 Vapor-Liquid-Separation Machine
29 Vapor-Liquid-Separation Machine
30 Ozone Gas
31 Water
32 Splitting Equipment
33 Ozone Processor
34 Flowmeter A
35 Flowmeter B
36 Mixer
37 Air Filter
38 Blower
39 Hydrogen Gas
40 Oxidation Catalyst
41 Steam
42 Pump
43 Pump
44 Condensator
45 Condensator
46 Water Supply Opening
47 Water Supply Opening
48 Ozone Level Automatic Controller
49 Ozone Extraction Opening
50 Platinum Plating

DRAWINGS

[Drawing 2]

[Drawing 1]



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L5: Entry 17 of 17 File: DWPI Oct 21, 1997

DERWENT-ACC-NO: 1998-005394
DERWENT-WEEK: 199821

TITLE: Ozone weather meter - comprises ozone generator with ion exchange membrane, cathode plate and anode plate

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ABSTRACTED-PUB-NO: JP 09273989A
BASIC-ABSTRACT:

The ozone weather meter tests cracks and deterioration of rubber in an ozone gas draft. An ozone generator comprises: (a) an ion exchange membrane, in which platinum plating is applied to both the surfaces of the membrane; (b) a cathode plate superimposed on one surface of the membrane, electrically connected to the membrane, and formed by applying platinum plating to a porous titanium plate serving as a current-feeding plate; and (c) an anode plate superimposed on the other surface of the membrane. The anode plate is electrically connected to the membrane and is formed by applying lead peroxide plating to a porous titanium plate serving as a current-feeding plate. The ion exchange membrane is sandwiched between the cathode plate and the anode plate. Both sides are superimposed by means of a box-like case for integration. Cylindrical projections provided on the inner surface of the case abut the cathode plate and the anode plate to the membrane. Electrolysis is applied to water by means of a DC voltage applied to the anode and the plate with pure water circulated in the case through a feed water port and a gas exhaust port provided in the case. Ozone gas generated on the anode is removed from the gas exhaust port. The ozone gas is diluted by means of air to feed the ozone gas to an ozone gas tester to evolve an atmosphere of required ozone concentration.

USE - Used in inspecting deterioration and cracks caused by ozone gas in e.g. rubber products, plastic products, and fibre products.

ADVANTAGE - The ozone weather meter enables a pure, high-concentration ozone gas test to be carried out without using a high-pressure oxygen cylinder, and accepts pure water in water electrolysis, using no hazardous aqueous electrolyte solution, e.g. sulphuric acid, caustic soda or caustic potassium. Hydrogen and ozone are released as water and oxygen respectively.

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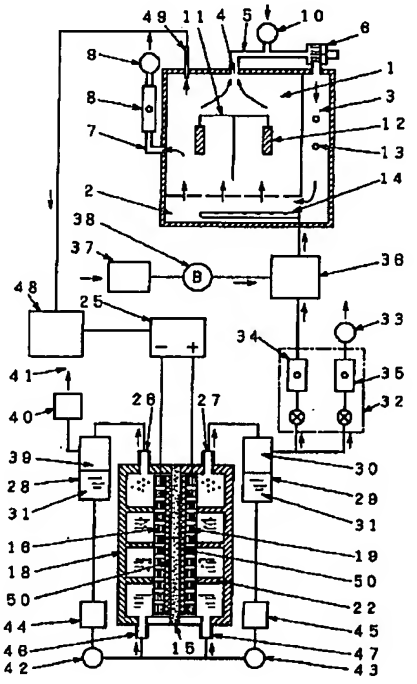
(54)【発明の名称】　オゾンウェザーメーター

(57)【要約】

【目的】　大気中に存在する微量のオゾンガスがゴム製品の亀裂の発生原因であり、人工的にオゾンガス雰囲気を作り、ゴム製品をはじめ、プラスチック、繊維製品等のオゾンガスによる劣化現象を調べるオゾンウェザーメーターに関するものである。

【構成】　オゾン発生機としてイオン交換膜の両膜面に白金メッキを施し、イオン交換膜を陰極板、陽極板で挟み、一体とし、陰極、陽極に印加された電圧で水を電気分解し、陽極板上で発生するオゾンガスを空気で希釈し、所要オゾン濃度雰囲気を作り出すことを特徴とするオゾンウェザーメーターによるものである。



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【特許請求の範囲】

【請求項１】　オゾンガス気流中でゴム等の亀裂、劣化現象を試験するオゾンウェザーメーターに関するもので、オゾン発生器としてイオン交換膜の両膜面に白金メッキを施し、片面にはこの面と電気的に接触し、給電板となる多孔チタン板に白金メッキした陰極板を重ね、他の面には同様に電気的に接触し給電板となる多孔チタン板に二酸化鉛メッキした陽極板を重ねて、イオン交換膜を陰極板、陽極板で挟み、その両側を函状ケースで重ね合わせて一体とし、函状ケース内面に設けられた複数本の円柱状突起物で陰極板、陽極板をイオン交換膜に圧接し、両函状ケースに設けられた給水口、ガス排出口で函状ケース内に純水を循環しながら、陰極、陽極に印加された直流電圧で水を電気分解し、陽極板上で発生するオゾンガスをガス排出口より取り出し、これを空気で希釈してオゾンガス試験槽に送気し、所要オゾン濃度雰囲気をつくりだすことを特徴とするオゾンウェザーメーター。

【請求項２】陽極板上で発生する酸素及びオゾンガスを分流装置で分流して、一部はエアーフィルタ、送風機を介して取り入れた空気と混合器で希釈して、オゾンガス放出管よりオゾンガス試験槽に送気し、他部はオゾン処理装置を通してオゾンを酸素に変換して外部に放出、試験槽中を所要濃度に調節する分流装置を用い、分流比を変えることにより、オゾン濃度範囲を拡大することを特徴とする請求項１のオゾンウェザーメーター。

【請求項３】オゾンガス試験槽中のオゾンガス濃度を表示・制御するオゾン濃度調節計で直流電源の電解電流を制御してオゾン発生量を制御、オゾン濃度の微細調整をすることを特徴とする請求項１のオゾンウェザーメーター。

【請求項４】函状ケース内純水をポンプで循環し、かつ循環系路中の気液分離器、冷却装置を介してガスと水を分けると共に、純水温度を一定に保持することを特徴とする請求項１のオゾンウェザーメーター。

【請求項５】陰極板上で発生する水素ガスを酸化触媒で酸化し、水蒸気にして、外気に放出することを特徴とする請求項１のオゾンウェザーメーター。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】この発明は、大気中に存在する微量のオゾンガスがゴム製品の亀裂の発生原因であり、人工的にオゾンガスを発生させてオゾンガス雰囲気をつくり、ゴム製品をはじめ、プラスチック、繊維製品等のオゾンガスによる劣化現象を調べるオゾンウェザーメーターに関するものである。

【０００２】

【従来の技術】人工的にオゾンガスを発生させるのに、従来は石英水銀灯による紫外線を利用、又は、無声放電によって同様空気中の酸素をオゾンガス化する方法がとられていた。石英水銀灯による紫外線を利用する方法は、オゾン濃度は０～２ppm 程度の低濃度にして、無声放電による方法は、２ppm 以上の高濃度は可能だが、無声放電によってオゾンガス発生の他、更にＮＯ、NO_2等の窒素酸化ガスの発生が伴う欠点があった。純粋のオゾンガスを得るためには酸素ガスボンベを用いて無声放電筒に酸素を供給しオゾンを発生させる必要があった。この方法は流量変化により濃度は一定せず、又、ボンベを用いることにより、火災等の危険性を伴った。

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【０００３】

【発明が解決しようとする課題】この発明は水を電気分解して、酸素と水素ガスを生成する際に二酸化鉛による触媒作用で酸素ガスをオゾンガスに変換してオゾンガスを発生させ、これを試験する所要濃度になるように空気で希釈して試験槽に送るようにしてなるオゾンウェザーメーターで、酸素ボンベは不要で純粋オゾンガスの低濃度から高濃度の広い範囲のオゾン試験を可能とするものである。

【０００４】

【課題を解決するための手段及び作用】上記の目的を達成するために、オゾン発生器としてイオン交換膜の両膜面に白金メッキを施し、片面にはこの面と電気的に接触し、給電板となる多孔チタン板に白金メッキした陰極板を重ね、他の面には同様に電気的に接触し給電板となる多孔チタン板に二酸化鉛メッキした陽極板を重ねて、イオン交換膜を陰極板、陽極板で挟み、その両側を函状ケースで重ね合わせて一体とし、函状ケース内面に設けられた複数本の円柱状突起物で陰極板、陽極板をイオン交換膜に圧接し、両函状ケースに設けられた給水口、ガス排出口で函状ケース内に純水を循環しながら陰極・陽極に印加された直流電圧で水を電気分解し、陽極板上で発生するオゾンガスをガス排出口より取り出し、これを空気で希釈してオゾンガス試験槽に送気し、所要オゾン濃度雰囲気をつくり出すことを特徴とするオゾンウェザーメーターによるものである。

【０００５】

【実施例】図１は本発明のオゾンウェザーメーターの一実施例である。オゾンガス試験槽１は、オゾンガスを分解しにくい材料で作られていて、下面と側面又は背面の外側に循環風路が形成されていて、天井中央の排気口４とダクト５で接続される循環送風機６によって空気は側面風路３、下面風路２を通って底板に開けられた多数の通気孔から吹き出してオゾンガス試験槽１に戻り、その一部のオゾンガスは側壁の排気管７を抜けて流量計８、排気処理器９を通って外気に放出され、又、ダクト５には分岐を設け、吸気フィルタ１０をつけて、清浄空気を取り込む。

【０００６】オゾンガス試験槽１の中央に試料架１１があり、試験片１２を吊るして試験を行う。

【０００７】側面風路３中にヒータ１３、下面風路２中

にオゾンガス放出管１４を設け、空気の循環中に温度、濃度の均一化を実施する構造となっており、ヒータ１３、オゾンガス放出管１４の位置は風路中であれば、側面、下面の特定はしない。

【０００８】オゾン発生機はフッ素樹脂系のイオン交換膜１５を利用した水電気分解による方法で図１にはその破断面を示している。

【０００９】図２はオゾン発生機の構成の一例を示し、イオン交換膜１５の両面は薄い白金メッキが施されていて、その一方の面には多孔チタンに白金メッキした陰極給電板１６が重なり覆っており、更にパッキン１７を介して函状ケース１８がこれを覆っている。

【００１０】イオン交換膜１５の他の白金メッキ面には多孔チタン板に二酸化鉛メッキ処理をした陽極給電板１９が重なり覆っており、更にパッキン２０を介して函状ケース２１がこれを覆っている。

【００１１】ケースの内側には円柱状突起物２２が複数本立っていて、函状ケースを重ね合わせた時にこの突起が陰極給電板１６、陽極給電板１９をイオン交換膜１５の白金メッキ面に押しつけるように働き、陰極給電板１６、陽極給電板１９とイオン交換膜１５の電気的接触が良くなり、電流が通り易く、更に、函状ケース１８、２１の合わせ部分は密封処理がなされ、水漏れのないようにされている。

【００１２】陰極給電板１６、及び陽極給電板１９にはそれぞれリード線２３、２４が函状ケース１８、２１を貫通して外部に引き出され、図１に示す直流電源２５の（－）極、（＋）極にそれぞれ接続され、陽極、陰極では下記の化学反応式（１）（２）（３）が生じる。

$$2H_2O \rightarrow O_2 + 4H^+ + 4e^- \quad \cdots\cdots (1)$$

$$3H_2O \rightarrow O_3 + 6H^+ + 6e^- \quad \cdots\cdots (2)$$

$$10H^+ + 10e^- \rightarrow 5H_2 \quad \cdots\cdots (3)$$

陽極において、（１）式は一般に水電気分解で酸素が発生する反応であるが、しかし、陽極に二酸化鉛メッキが施されていると、その触媒作用で水分解で発生した酸素原子［Ｏ］はすぐに酸素分子O_2と結合し、オゾンO_3になる（２）式が成立して、（１）、（２）式で発生した水素イオンH^+はイオン交換膜中を移動し陰極に到達し、電荷をもらって水素ガスとなる。

【００１３】陰極では（３）式が成立することにより、β型PbO_2を用いた電極では２０Ａ／ｄｍ^{2}で約６％のオゾン濃度発生が確認された。

【００１４】図１において、オゾンガス＋酸素ガス（以下、オゾンガスと称す。）及び水素ガス３９は函状ケース１８、２１の上部、ガス排出管２６、２７より出てそれぞれの気液分離器２８、２９に入り、オゾンガス３０は分流装置３２に導かれてここでオゾンガス試験槽１内の所要オゾン濃度に適合した試験槽へ送るべきガス流量とオゾン処理装置３３で分解処理すべき流量とに分流配分する。

【００１５】即ち、流量計Ａ３４、流量計Ｂ３５に配分された流量に設定し、流量計Ａ３４を通過したオゾンガスは混合器３６に入り、ここでエアーフィルタ３７を通って送風機３８で吸引された新鮮空気により希釈混合し、オゾン放出管１４からオゾンガス試験槽１内に放出され、流量計Ｂ３５を通過したオゾンガスはオゾン処理装置３３を通過してオゾンから酸素に変えられて外気に放出する。

【００１６】一方、気液分離器２８に入った水素ガス３９は酸化触媒４０を介在しての化学反応で水蒸気４１として外部に放出する。

【００１７】電気分解に伴って発生する熱は気液分離器２８、２９の底部に溜まる水をポンプ４２、４３で吸い上げ、冷却器４４、４５を通して函状ケース底部の給水口４６、４７に戻すことにより、冷却器４４、４５によって外部に放出され、冷却器の装置は図に示さないが、水冷式、空冷式が考えられるが一般にファン冷却の空冷式が多く用いられており、これは水素ガス側、オゾンガス側共に実施される。

【００１８】電気分解の直流電源２５の電流はオゾン濃度調節計４８によって制御されていて、オゾンガス試験槽１に設けられたオゾン採取口４９より試験槽内のオゾンガスをオゾン濃度調節計４８に取り込み、オゾンガス濃度を測定すると共にその値が設定値と一致するように電流値を制御する方式、即ち、設定値に対し、測定した値が低い場合は電流を増加して電気分解を盛んにしてオゾンガスの発生量を増やし、逆に設定値に対し測定した値が高い場合には電流を減らして電気分解を縮小しオゾンガスの発生量を減らすことにより、設定値に近ずけ、試験槽内オゾン濃度を設定値に一致させるように調節する。

【００１９】水を電気分解して得られるオゾンガスは純粋であり、一方で空気を無声放電して得られるオゾンガスの場合は空気中の窒素ガスが酸化するために発生するＮＯやNO_2が混入していたために、純粋なオゾンガスによる影響の他に窒素酸化物の影響を受けていたが、ここに、本発明により純粋なオゾンガスによる劣化試験が可能となった。

【００２０】

【発明の効果】本発明によれば、高圧酸素ボンベ等を使わないで純粋な高濃度のオゾンガス試験が可能となった。水電気分解に際しても、イオン交換膜使用のために供給水は純水で良く、硫酸、苛性ソーダ、苛性カリ等の危険な電解質水溶液を使う必要もないので極めて安全である。排気されるガス、即ち、水素ガスは水として、オゾンガスは酸素ガスとして安全なガスに変えて外気に放出されるので極めてクリーンで安全な試験機となった。

【図面の簡単な説明】

【図１】本発明を実施したオゾン発生機を具備したオゾンウェザーメーターの構成図。

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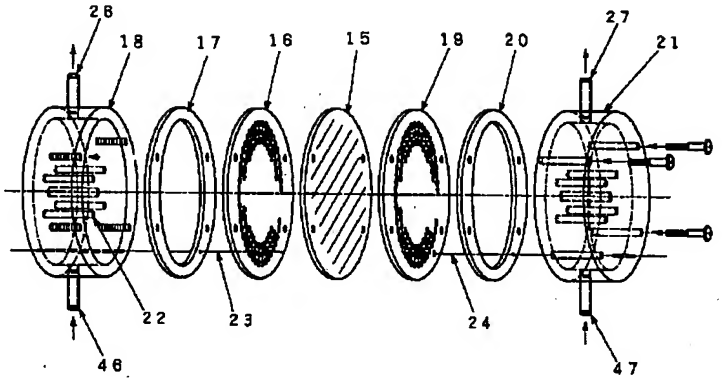
【図２】図１の装置に用いたオゾン発生機の構成図。

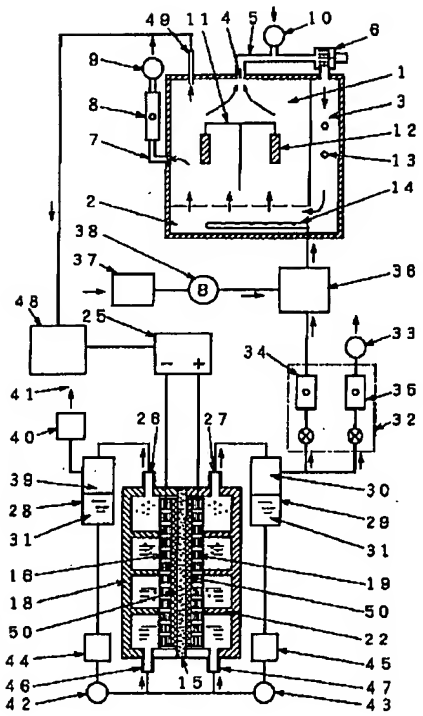
【符号の説明】

１　オゾンガス試験槽
２　下面風路
３　側面風路
４　排気口
５　ダクト
６　循環送風機
７　排気管
８　流量計
９　排気処理器
１０　吸気フィルタ
１１　試料架
１２　試験片
１３　ヒータ
１４　オゾンガス放出管
１５　イオン交換膜
１６　陰極給電板
１７　パッキン
１８　函状ケース
１９　陽極給電板
２０　パッキン
２１　函状ケース
２２　円柱状突起物
２３　リード線
２４　リード線
２５　直流電源
２６　ガス排出管
２７　ガス排出管
２８　気液分離器
２９　気液分離器
３０　オゾンガス
３１　水
３２　分流装置
３３　オゾン処理装置
３４　流量計Ａ
３５　流量計Ｂ
３６　混合器
３７　エアーフィルタ
３８　送風機
３９　水素ガス
４０　酸化触媒
４１　水蒸気
４２　ポンプ
４３　ポンプ
４４　冷却器
４５　冷却器
４６　給水口
４７　給水口
４８　オゾン濃度調節計
４９　オゾン採取口
５０　白金メッキ

【図２】



【図1】



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